a·'ku·stiks

[n. pl. defining sound for the next generation]

Memorandum

To: Jonathan Martin & Steve Loftin

From: Paul Scarbrough and Chris Blair

Date: 5 February 2019

Re: Responses to FC Cincinnati Statement Pages: 1

I reviewed the FC Cincinnati Statement and have some thoughts:

1. Crowd size:

   The new FC Cincinnati Stadium seats 26,000. At maximum capacity, Nippert Stadium seats 40,000 (after the 2014 stadium renovation, according to published sources). Decibels are logarithmic values so multiple sound sources do not add using typical arithmetic, but rather logarithmic addition. Two 90 decibel sources do not therefore result in 180 dB, but rather 93 dB. The difference in sound pressure levels from multiple, like sound sources can be calculated by adding 10 times the logarithm of the number of sources to the sound pressure level of one source.

   Calculating the difference in crowd noise on this basis reveals that the crowd noise in Nippert would be only 2 dB louder than that in the new stadium, a negligible difference.

2. Building Comparison:

   Comparing CCM to Music Hall is comparing apples and oranges.

   CCM is a campus of buildings constructed new or renovated and adapted from other uses over the past 65+ years. The most recent major development project was completed in 1999 at a cost of $93.2 million. This project was undertaken after the completion of the Nippert Stadium renovation of 1992 that expanded its capacity to over 35,000 seats, so the acoustical designers of the CCM project would have been well aware of the stadium and would have designed appropriate noise control measures into the plans to mitigate stadium noise impacts to the greatest extent possible.

   By comparison, Music Hall was constructed in 1878 and is fundamentally a 19th Century building with heavy masonry walls, but a comparatively lightweight roof system, typical of the era. The most recent renovation made improvements to sound isolation in the building with a focus on Springer Auditorium, but these were developed in the context of the largely residential West End noise environment as it was known in 2015. At that time there was no indication that a major new noise source would be added in the West End, so there was no perceived need to prioritize major improvements to the sound isolation properties of the roof over Springer Auditorium, or any of the other venues in Music Hall.

3. Distance Comparison:

   Propagation of sound from a point source, absent obstructions or reflecting surfaces, falls off according to the inverse square law. In simple terms, this means that sound levels fall off 6 dB every time you double the distance from the source. According to the FC Cincinnati statement, the closest CCM performance venue is 408-feet from Nippert while Springer is 630 feet from the new stadium. Calculating the dB level difference based upon these distances reveals a level at Springer that is just 4 dB lower than the level at the CCM performance venue.

In these situations, it is often tempting to compare an existing venue to the proposed development. Unfortunately, some aspects of acoustics are counterintuitive, which makes such comparisons far less accurate and therefore less insightful than might be supposed.